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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,563	01/02/2002	Masahiro Ishida	740819-723	5817

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EXAMINER

MALDONADO, JULIO J

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 04/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/032,563

Applicant(s)

ISHIDA, MASAHIRO

AK

Examiner

Julio J. Maldonado

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/10/2004 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3 and 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (U.S. 6,113,685) in view of Asai et al. (U.S. 6,426,519 B1).

Wang et al. (Fig.1) in a related method to form a nitride layer teach a first step of providing an upper portion of a base substrate (12); a second step of growing a semiconductor layer of nitride (10) on said upper portion of said base substrate (12), wherein said upper surface of said semiconductor layer (10) is thereof even; and a third step of irradiating an interface between said semiconductor layer (10) and said base substrate (12) with a laser beam (14), thereby separating said semiconductor from said base substrate (12) to form a semiconductor substrate from said semiconductor layer

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(10) (column 2, line 20 – column 3, line 25). Wang et al. also teach wherein in said third step, the laser beam (14) is irradiated upon said semiconductor layer (10) from the surface opposite to the upper portion of said base substrate (12) and upon at least a portion in said base substrate while scanning along portions surrounded by a region (13) on said base substrate (12), while stress is being generated at the interface between the base substrate (12) and the semiconductor layer (10) when the base substrate (12) is cool down (column 3, lines 3 –25).

Wang et al. fail to teach a first step of selectively forming a raised and recessed region in an upper portion of a base substrate with a plurality of grooves extending parallel to each other, wherein the area occupied by the recessed portions is about in the range from about 1/5 to about 100 times the area occupied by the raised portions. However, Asai et al. (Figs.3-5) in a related method to form a nitride layer teach a first step of selectively forming a raised and recessed region in an upper portion of a base substrate (21) with a plurality of grooves (24) extending parallel to each other, wherein the area occupied by the recessed portions is about the same as the area occupied by the raised portions; and growing a nitride layer (26) over the upper portion of the base substrate (21), wherein forming the raised and recessed regions would result in a nitride layer (26) with reduced dislocations (column 4, line 5 – column 5, line 32). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Asai et al. and Wang et al. to enable the upper surface having raised and recessed portions as taught by Asai et al. to be formed in the semiconductor forming process of Wang et al. It would also have been obvious to one

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of ordinary skill in the art at the time the invention was made to combine the teachings of Wang et al. and Asai et al. to enable irradiating at least a raised portion surrounded by a groove in the substrate as taught by Asai et al. with the laser beam as taught by Wang et al.

The combined teachings of Wang et al. and Asai et al. fail to expressly teach wherein stress is being generated at the top of the raised portion of the based substrate. However, since the process and the materials of the combined teachings of Wang et al. and Asai et al. are being treated the same way as that of the claimed invention, the same results (i.e., generated stress) would be obtained.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. ('685) in view of Asai et al. ('519 B1) as applied to claims 1-3 and 5-8 above, and further in view of Sunakawa et al. (U.S. 6,348,096 B1).

The combined teachings of Wang et al. and Asai et al. substantially teach all aspects of the invention including providing a base substrate comprising sapphire but fail to teach wherein the base substrate comprises sapphire whose main surface is in the {0001} plane orientation, and the direction of the zone axis of each said groove is in the {1-100} direction in said base substrate. However, Sunakawa et al. (Fig.1) in a related method to form a nitride layer teach providing a base substrate (11) comprising sapphire whose main surface is in the {0001} plane orientation, and the direction of the zone axis of a plurality of grooves (13) in the {1-100} direction in said base substrate (11) (column 3, line 9 – column 5, line 45). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the sapphire

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base substrate and the grooves in the plane direction as taught by Sunakawa et al. in the nitride layer formation method as taught by Wang et al. and Asai et al., since this would improve the flatness of the nitride layer (column 5, lines 38 – 45).

Response to Arguments

5. Applicant's arguments filed 01/12/2004 have been fully considered but they are not persuasive.

Applicants argue that the combined teachings of Wang et al. and Asai et al. fail to teach wherein stress is being generated at the top portion of the raised region. In response to this argument, the combined teachings of Wang et al. and Asai et al. fail to expressly teach a specific region where the stress is being generated. However, by performing the method of forming semiconductor layers of Wang et al. and Asai et al., a semiconductor layer is formed on a base substrate having top and recessed portions. Since the combined teachings of Wang et al. and Asai et al. are forming the a semiconductor layer comprising the same material as that of the claimed invention (i.e., GaN) on a base substrate comprised of the same material as that of the claimed invention (i.e., sapphire), one of ordinary skill in the art would achieve the same result (i.e., generated defect).

Conclusion

6. Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is 571-272-2800. See MPEP 203.08.

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7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Julio J. Maldonado whose telephone number is (571) 272-1864. The examiner can normally be reached on Monday through Friday.

8. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (571) 272-1855. The fax number for this group is 703-872-9306 for before final submissions, 703-872-9306 for after final submissions and the customer service number for group 2800 is (703) 306-3329.

Updates can be found at <http://www.uspto.gov/web/info/2800.htm>.

Julio J. Maldonado
April 22, 2004

Julio J. Maldonado
Patent Examiner
Art Unit 2823


George Foulson
Primary Examiner